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Background

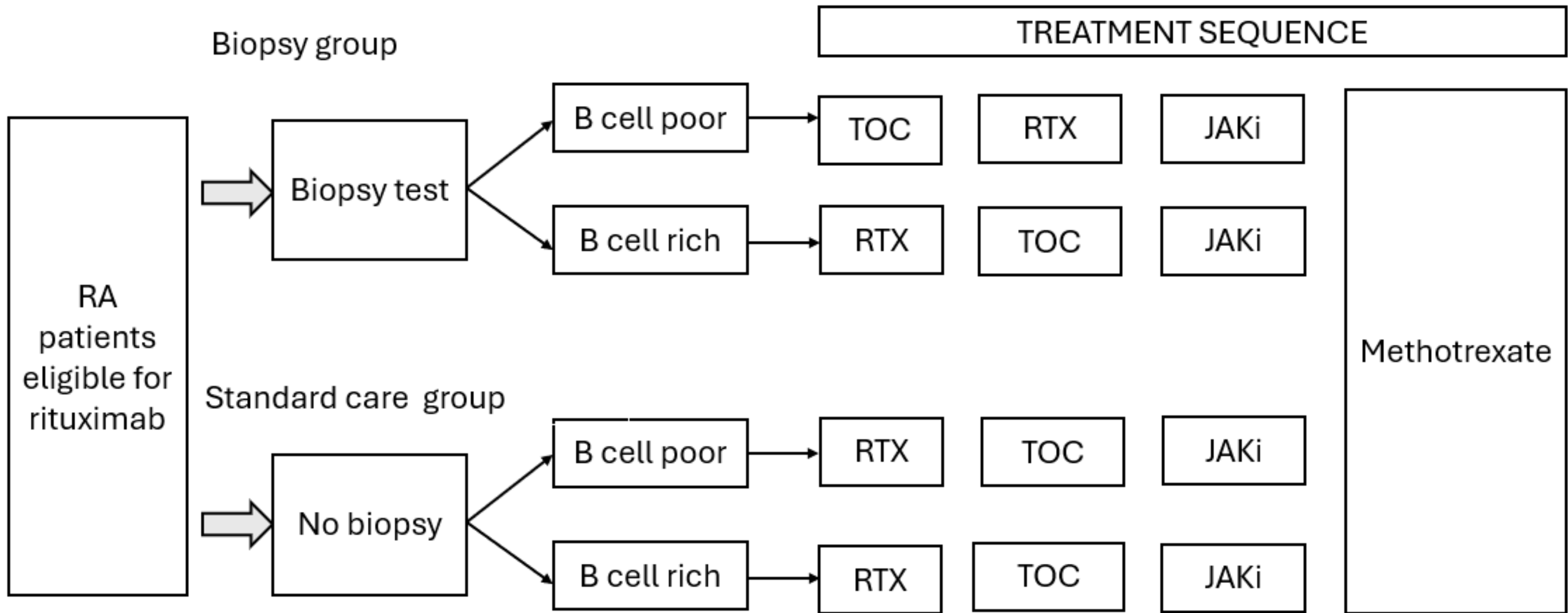
- Treatment response in rheumatoid arthritis (RA) is heterogeneous, and current trial-and-error therapy leads to repeated biologic switching, delayed disease control, and higher healthcare costs.
- Synovial tissue analysis offers a precision approach by identifying molecular signatures that may predict treatment response.
- A global phase IV clinical trial R4RA demonstrated that patients lacking synovial B-cell signatures (B-cell poor) had significantly better clinical responses to tocilizumab versus rituximab¹.
- These findings suggest that synovial biopsy–guided treatment selection may optimize second-line biologic therapy.
- An economic evaluation is required to determine whether improved outcomes justify the added costs of synovial biopsy implementation.

Aim

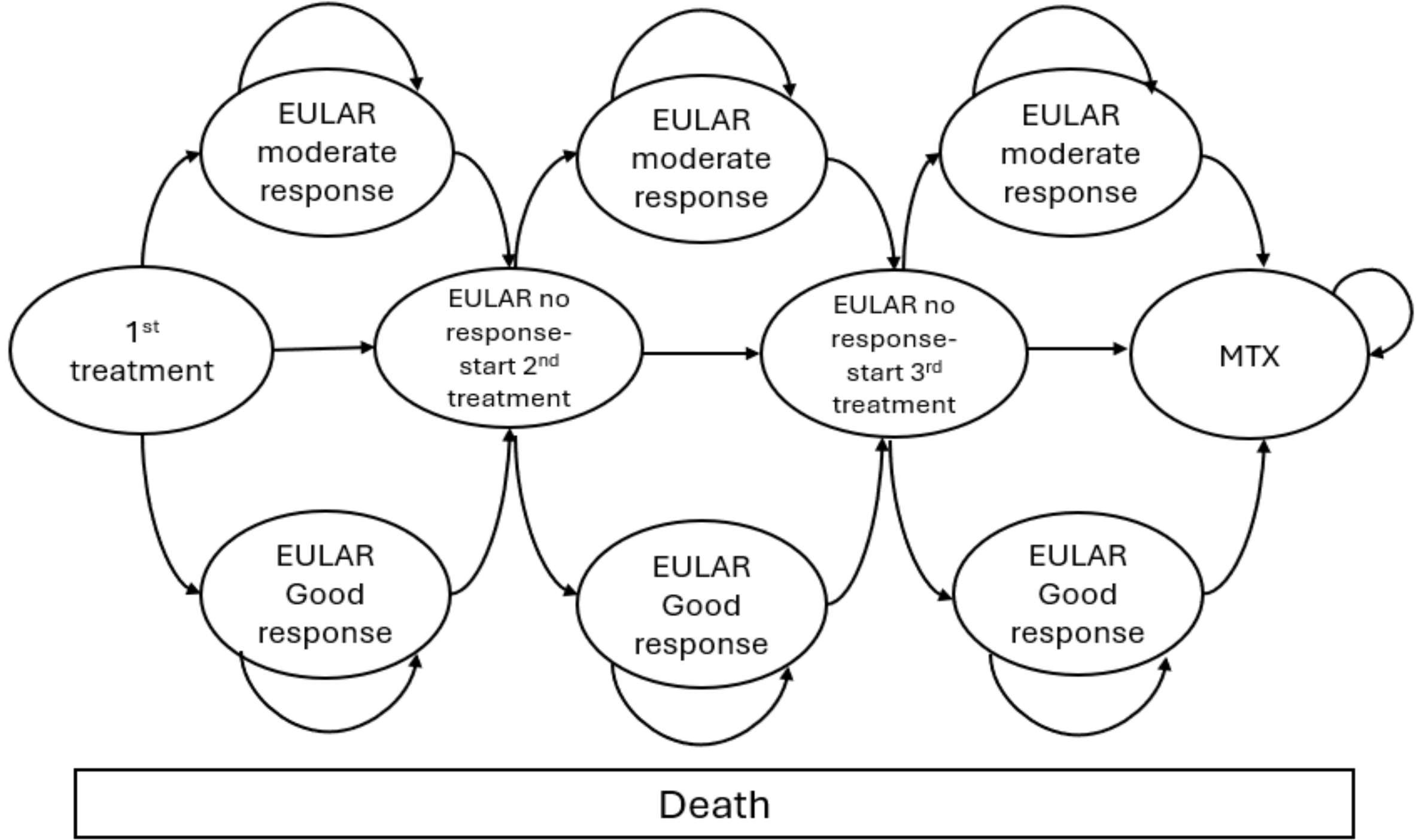
- Evaluate the incremental costs and health outcomes of synovial biopsy–guided treatment versus standard care after TNF-α inhibitor failure in RA.
- Identify key drivers of cost-effectiveness associated with implementing this intervention in clinical practice.

Methods

Decision Tree - Patient classification before enter Markov model



Markov Model – Lifetime disease progression simulation



RTX: rituximab, TOC: tocilizumab, JAKi: Janus kinase(JAK) inhibitor, MTX: Methotrexate, EULAR: European League Against Rheumatism
EULAR response criteria are used to evaluate treatment response in patients with RA by classifying clinical improvement based on changes in the Disease Activity Score in 28 joints (DAS28)

PICO

Population: People with RA eligible for rituximab
Intervention: Synovial biopsy–guided treatment
Comparator: Standard of care
Outcomes: Costs, QALYs, ICER

Model Setting

Perspective: NHS England
Cycle Length: 6 months

Intervention Cost

- Cost of synovial biopsy-guided procedure were estimated via a micro-costing study²
- Best- and worst-case cost estimation using lower and upper value of parameters were included in the scenario analysis

EQ-5D estimation: Two-step mapping method

- Step1. Pain VAS predicted using mapping study involving HAQ³
- Step2: EQ-5D predicted using mapping function involving HAQ + pain VAS⁴

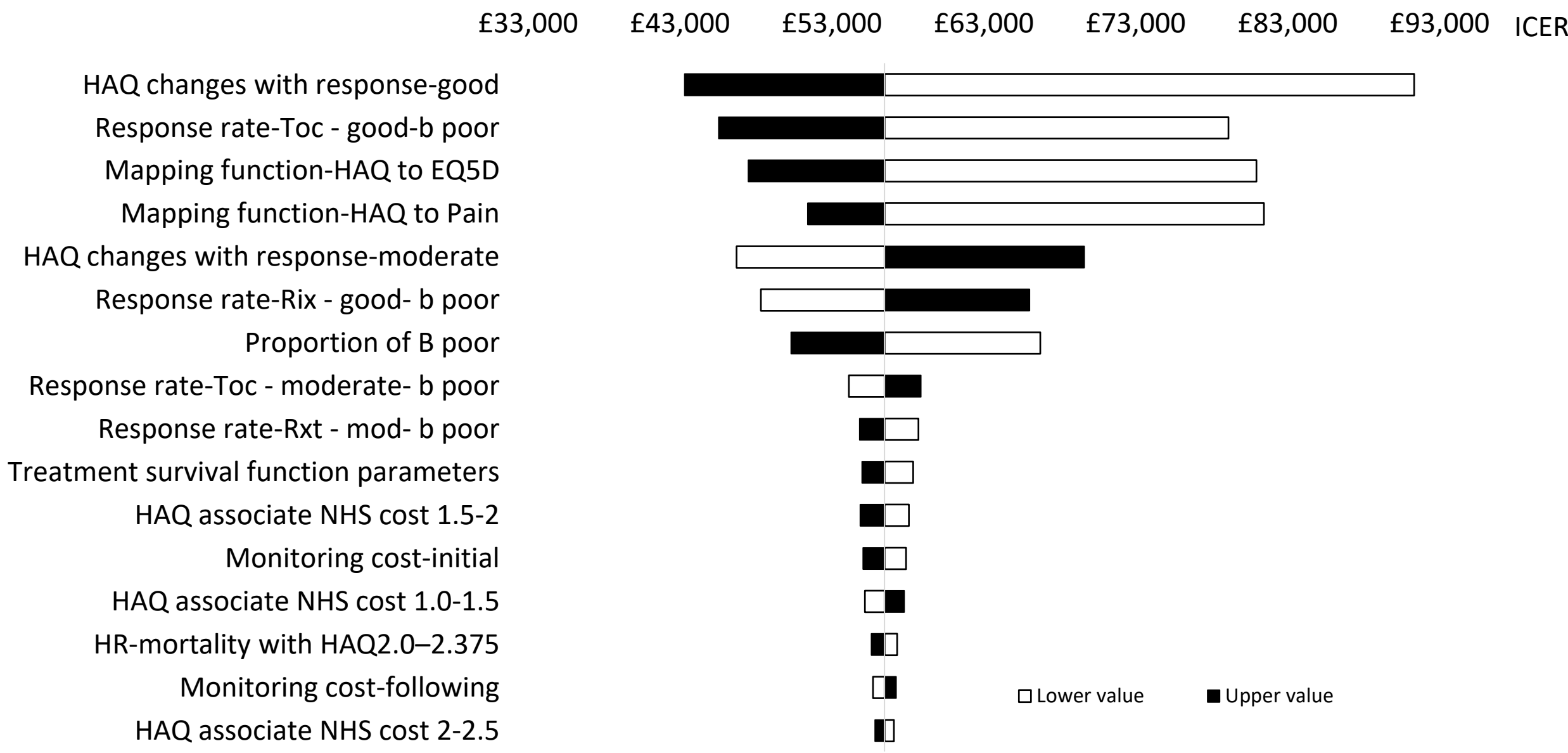
Pain-VAS: Visual Analog Scale for Pain, HAQ: Health Assessment Questionnaire

Results

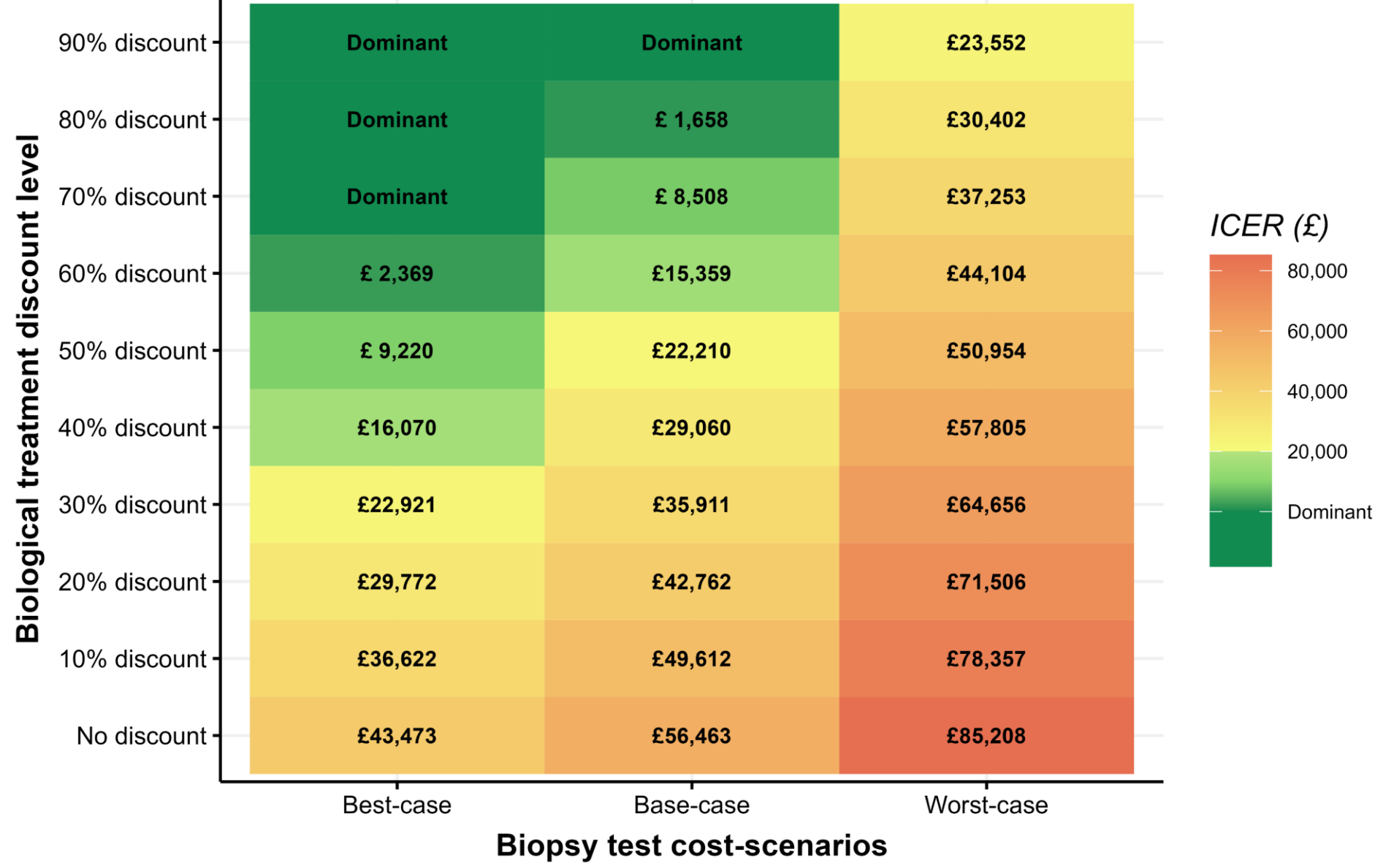
Base-case result

	Costs	QALYs	Incremental Costs	Incremental QALYs	ICER
Biopsy-guided treatment	£104,873	5.660	£838.46	0.015	£56,462
Standard of care	£104,035	5.645			

One-way sensitivity analysis - Tornado diagram

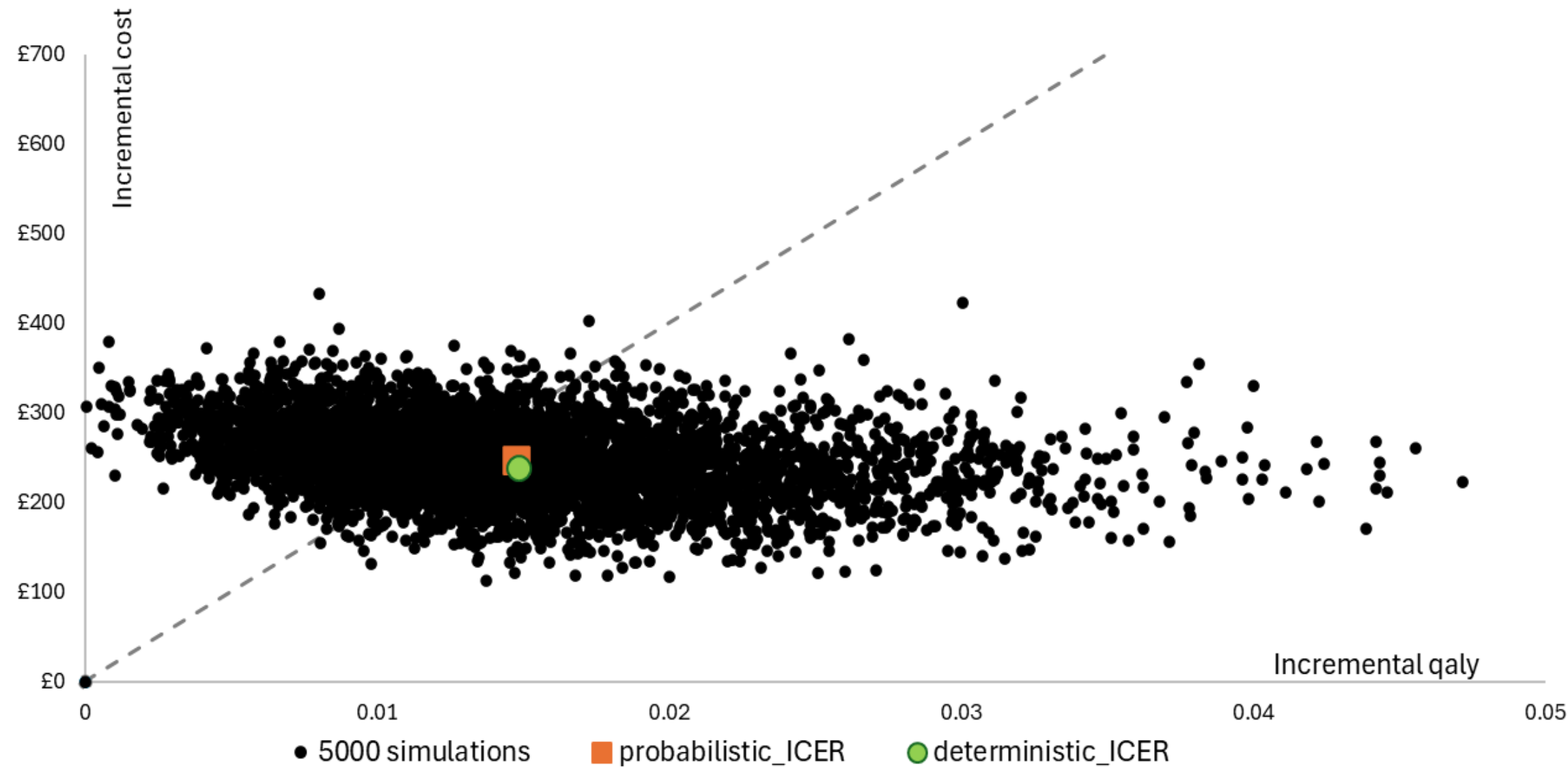


Two-way sensitivity analysis: biopsy test cost and price of biologics



- When the biopsy test price is the best-case cost and the discount on biologics is over 40%, the biopsy-guided intervention will be cost-effective under the WTP of £20k

Cost-Effectiveness plane using best-case biopsy-guided cost with 40% discount on biologics cost



- The probability of biopsy-guided intervention being cost-effective is 59.34% under the WTP of £20k

Discussion

- Key drivers of cost-effectiveness are reducing the cost of the biopsy-guided procedure and securing price discounts on biologic therapies.
- Clinical integration can be supported by implementing standardized training programs to lower biopsy-related costs.
- Clinical effectiveness and utility estimates are influential parameters, highlighting the need for a pragmatic RCT with economic evaluation.
- Using synovial biopsy earlier in the treatment pathway (before biologics) may provide greater clinical benefit and should be explored.

Reference

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